

A Case for a Closer Look at Migration Summary

In this thesis, net migration to/from Puerto Rico is examined both in the short-term and the long-term. Migration is presented as an important variable for economic development, demographic change, and long-term government funding and planning in Puerto Rico. Furthermore, it is shown that, in Puerto Rico, migration in the last decade has had more impact on demographics than deaths and births.

Any change in population can be considered a function of the amount of (1) births, (2) deaths, (3) immigrations, and (4) emigrations in a period of time. In general, births and deaths have taken center stage in most actuarial, demographic, and health studies. However, the experience in Puerto Rico, as shall be seen throughout this work, has brought about a case for a closer look at migration.

In Puerto Rico, migration started to become an observable and quantifiable variable by 2014 with the publication of The Migrant's Profile (*Perfil del Migrante*) [52 – 57]. Notwithstanding the relative youth of the data, it is known, from Passenger data and the decennial Census, that Puerto Rico has had a long history of mass migrations; the biggest, prior to the one seen in the last decade, being in the 1950s **Error! Reference source not found..** These facts serve as motivation for this work.

This Thesis is organized into four (4) chapters and a conclusion. The chapters and their contents are as follows:

- In Chapter 1, a brief introduction of Puerto Rican history post-U.S. invasion, a summary of the pension crisis in Puerto Rico, and a small numerical example on the economic impact of migration are outlined. Particular attention is given to the four (4) public laws and reforms that have set the benefits currently being paid in the Government's pay-as-you-go system, as well as the reasons that brought about these changes.
- In Chapter 2, a literary review on migration models is presented. The core of the review is centered around four (4) main models: Probabilistic Extrapolation of Time Series, Expert Opinion Modelling, Bayesian Forecasting, and Econometric Models with Covariate Information. The chapter closes with a literary review of migration from the point of view of Puerto Rico.
- In Chapter 3, the different sources of data are described. Three official institutions gather and publish data on Puerto Rican population movements. These are: (1) The U.S. Census Bureau, (2) The U.S. Bureau of Transportation Statistics' Research and Innovative Technology Administration (RITA), and (3) The Port Authority of Puerto Rico (La Autoridad de los Puertos de Puerto Rico).
- In Chapter 4, Puerto Rico's net migration is estimated both in the short-term and long-term. Short-term forecasts of monthly net passengers are represented as an ARIMA process, while the long-term behavior of net migration is modeled in terms of an Ornstein-Uhlenbeck process.

The calculations were done using R statistical software.